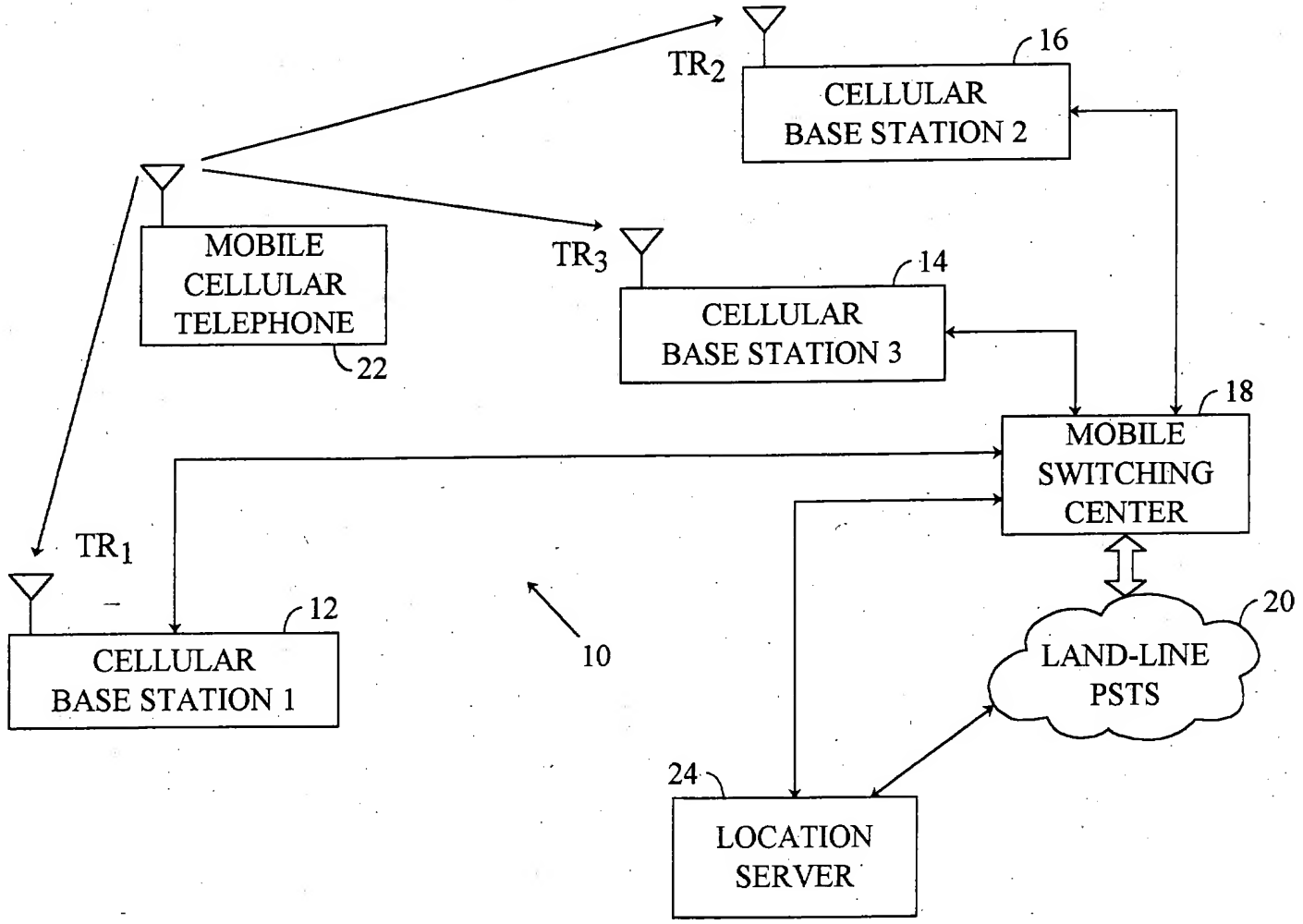

FIG. 1
(PRIOR ART)

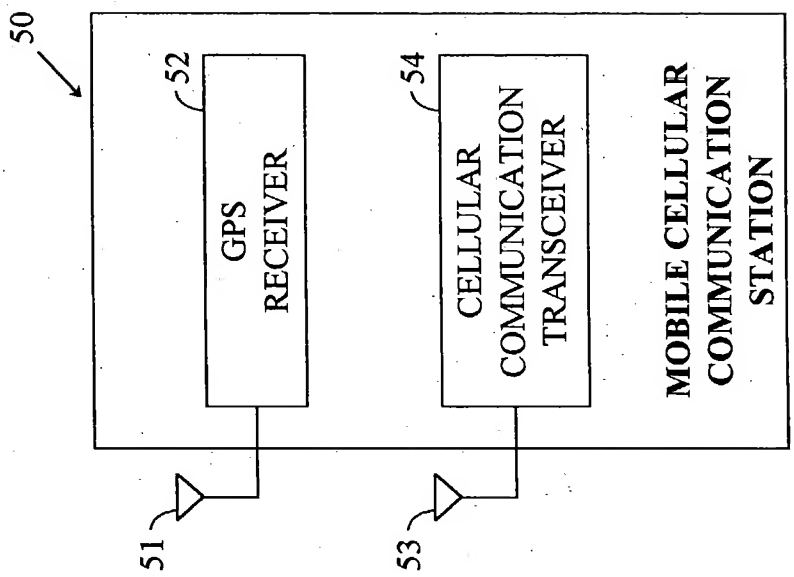
50
52
GPS
RECEIVER
54
CELLULAR
COMMUNICATION
TRANSCEIVER
MOBILE CELLULAR
COMMUNICATION
STATION
51
53

FIG. 2

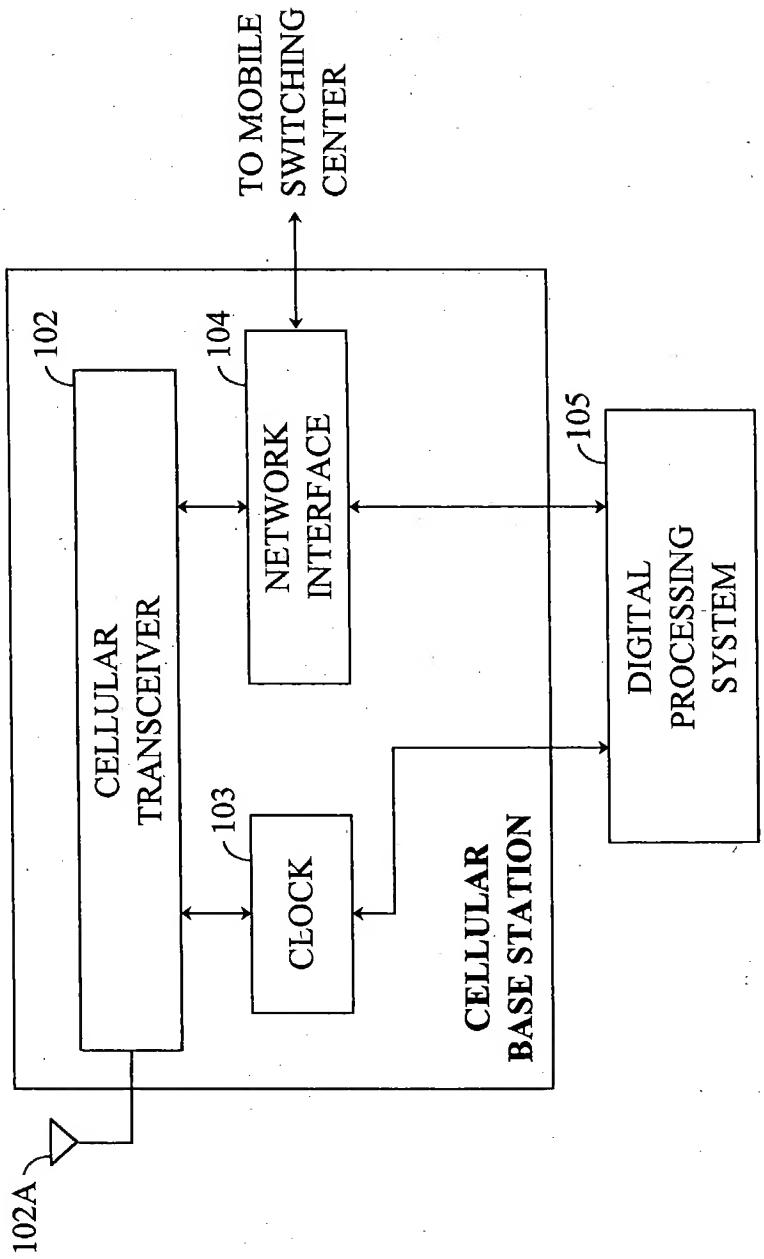
TO MOBILE SWITCHING CENTER
101
102
104
105
CELLULAR TRANSCEIVER
NETWORK INTERFACE
DIGITAL PROCESSING SYSTEM
103
CLOCK
CELLULAR BASE STATION
102A

FIG. 3

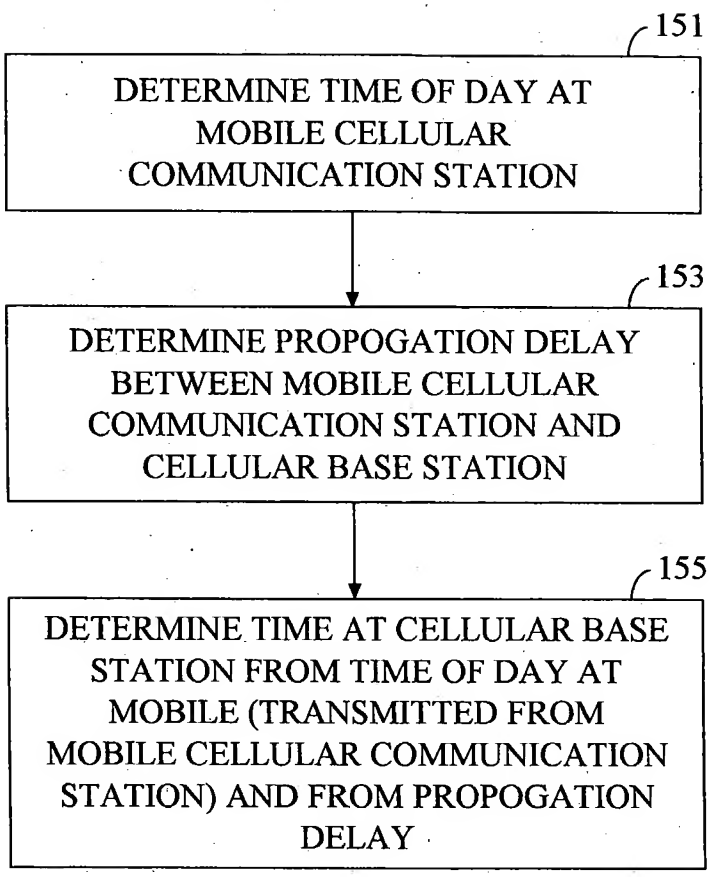
151
DETERMINE TIME OF DAY AT MOBILE CELLULAR COMMUNICATION STATION
153
DETERMINE PROPOGATION DELAY BETWEEN MOBILE CELLULAR COMMUNICATION STATION AND CELLULAR BASE STATION
155
DETERMINE TIME AT CELLULAR BASE STATION FROM TIME OF DAY AT MOBILE (TRANSMITTED FROM MOBILE CELLULAR COMMUNICATION STATION) AND FROM PROPOGATION DELAY

FIG. 4

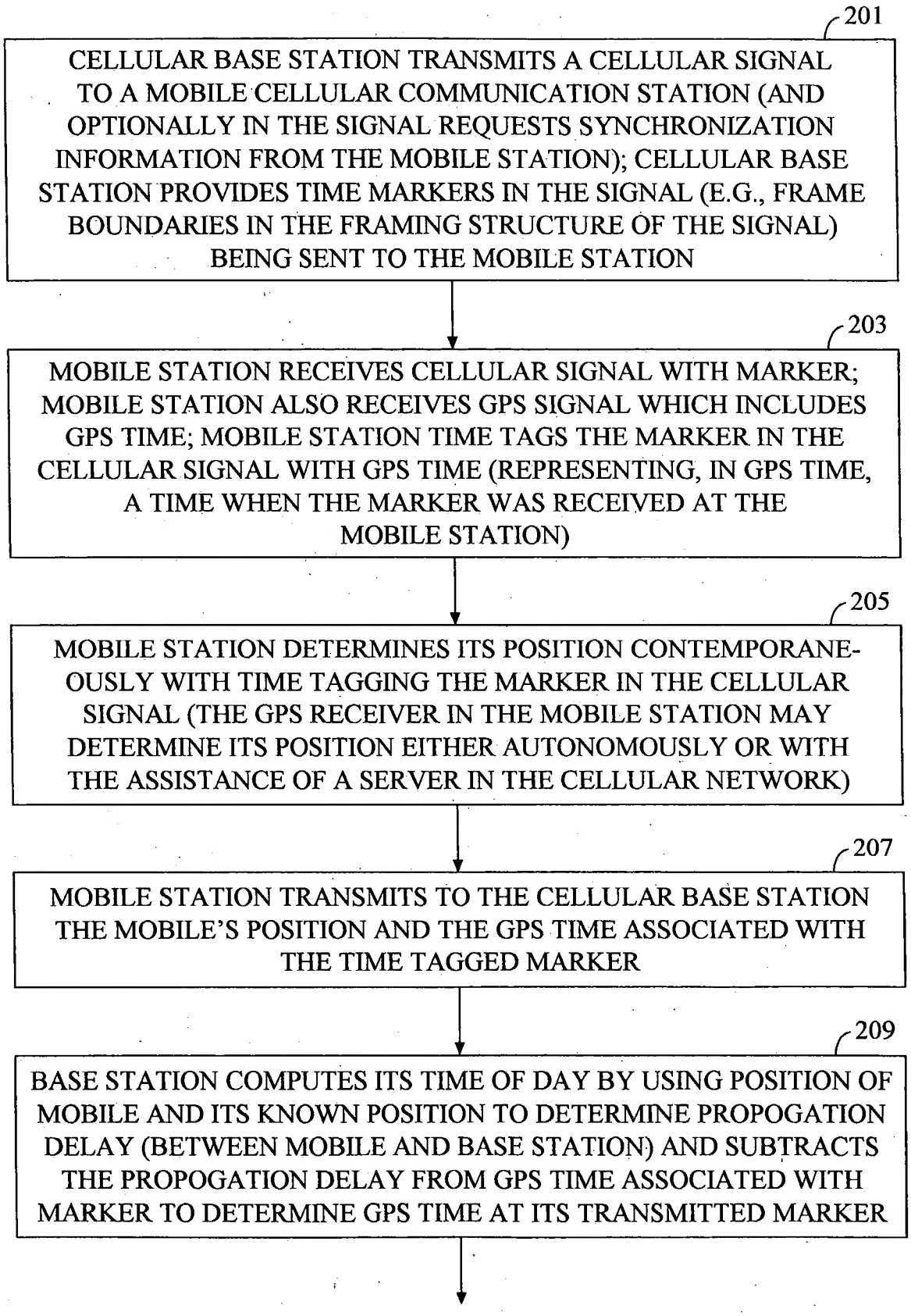
201
CELLULAR BASE STATION TRANSMITS A CELLULAR SIGNAL TO A MOBILE CELLULAR COMMUNICATION STATION (AND OPTIONALLY IN THE SIGNAL REQUESTS SYNCHRONIZATION INFORMATION FROM THE MOBILE STATION); CELLULAR BASE STATION PROVIDES TIME MARKERS IN THE SIGNAL (E.G., FRAME BOUNDARIES IN THE FRAMING STRUCTURE OF THE SIGNAL) BEING SENT TO THE MOBILE STATION
203
MOBILE STATION RECEIVES CELLULAR SIGNAL WITH MARKER; MOBILE STATION ALSO RECEIVES GPS SIGNAL WHICH INCLUDES GPS TIME; MOBILE STATION TIME TAGS THE MARKER IN THE CELLULAR SIGNAL WITH GPS TIME (REPRESENTING, IN GPS TIME, A TIME WHEN THE MARKER WAS RECEIVED AT THE MOBILE STATION)
205
MOBILE STATION DETERMINES ITS POSITION CONTEMPORANEOUSLY WITH TIME TAGGING THE MARKER IN THE CELLULAR SIGNAL (THE GPS RECEIVER IN THE MOBILE STATION MAY DETERMINE ITS POSITION EITHER AUTONOMOUSLY OR WITH THE ASSISTANCE OF A SERVER IN THE CELLULAR NETWORK)
207
MOBILE STATION TRANSMITS TO THE CELLULAR BASE STATION THE MOBILE'S POSITION AND THE GPS TIME ASSOCIATED WITH THE TIME TAGGED MARKER
209
BASE STATION COMPUTES ITS TIME OF DAY BY USING POSITION OF MOBILE AND ITS KNOWN POSITION TO DETERMINE PROPOGATION DELAY (BETWEEN MOBILE AND BASE STATION) AND SUBTRACTS THE PROPOGATION DELAY FROM GPS TIME ASSOCIATED WITH MARKER TO DETERMINE GPS TIME AT ITS TRANSMITTED MARKER
TO FIG. 5B

FIG. 5A

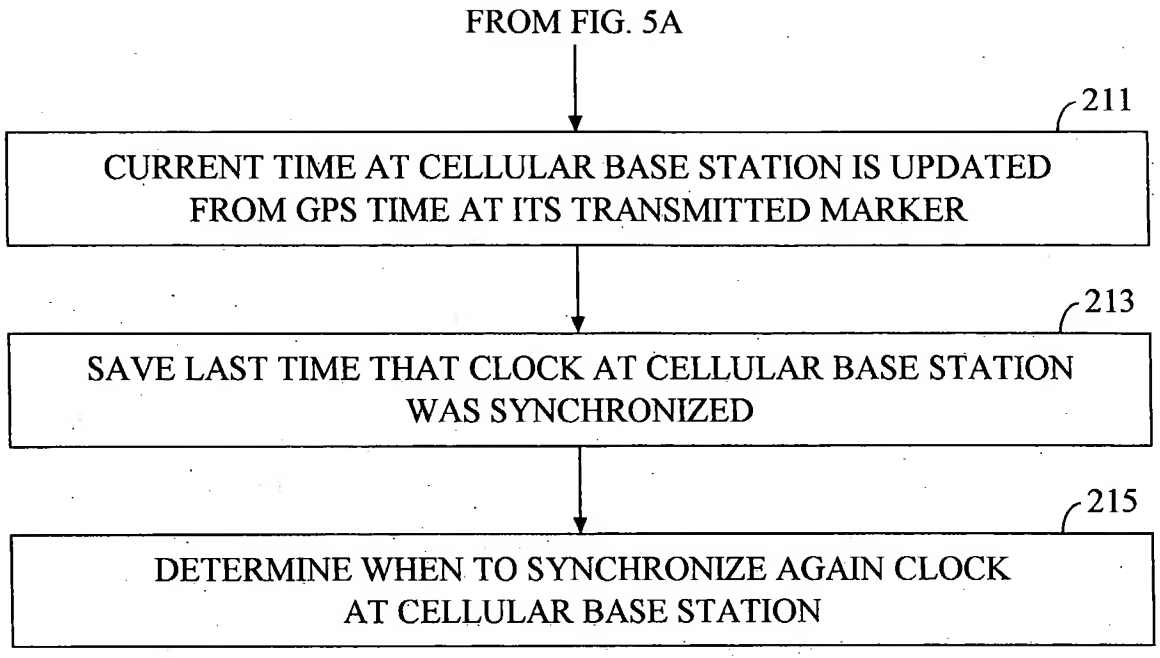
FROM FIG. 5A
211
CURRENT TIME AT CELLULAR BASE STATION IS UPDATED FROM GPS TIME AT ITS TRANSMITTED MARKER
213
SAVE LAST TIME THAT CLOCK AT CELLULAR BASE STATION WAS SYNCHRONIZED
215
DETERMINE WHEN TO SYNCHRONIZE AGAIN CLOCK AT CELLULAR BASE STATION

FIG. 5B

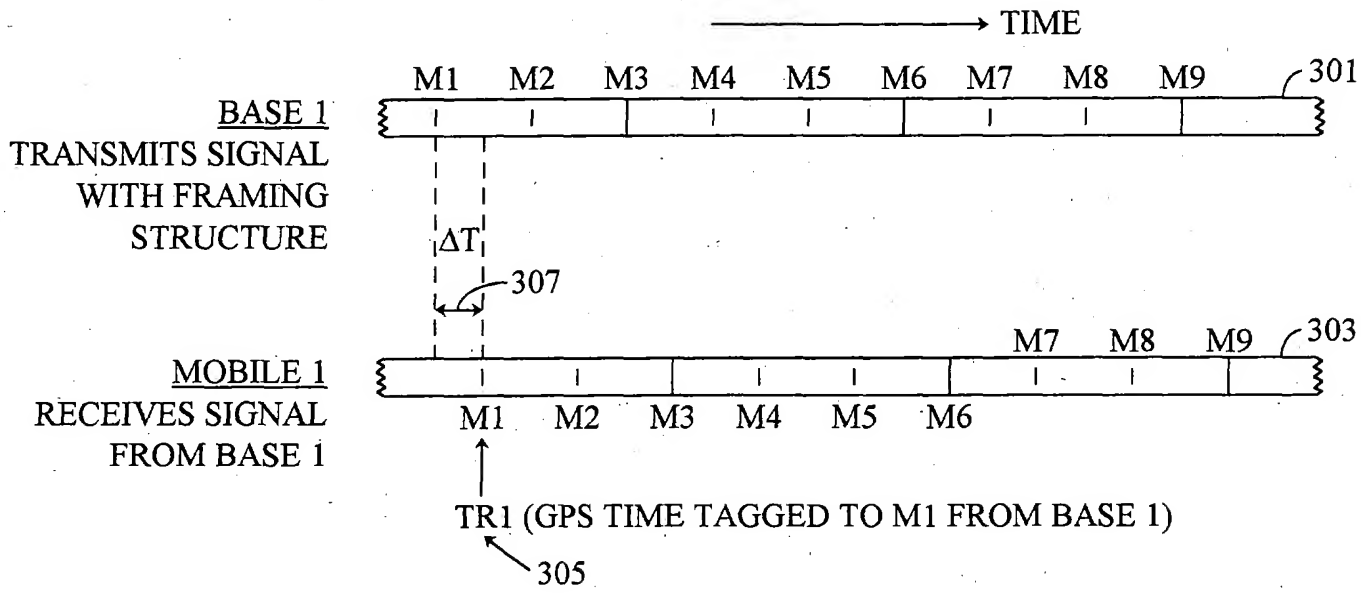
TIME
M1 M2 M3 M4 M5 M6 M7 M8 M9
301
BASE 1
TRANSMITS SIGNAL
WITH FRAMING
STRUCTURE
ΔT
307
M7 M8 M9
303
MOBILE 1
RECEIVES SIGNAL
FROM BASE 1
M1 M2 M3 M4 M5 M6
TR1 (GPS TIME TAGGED TO M1 FROM BASE 1)
305

FIG. 6A

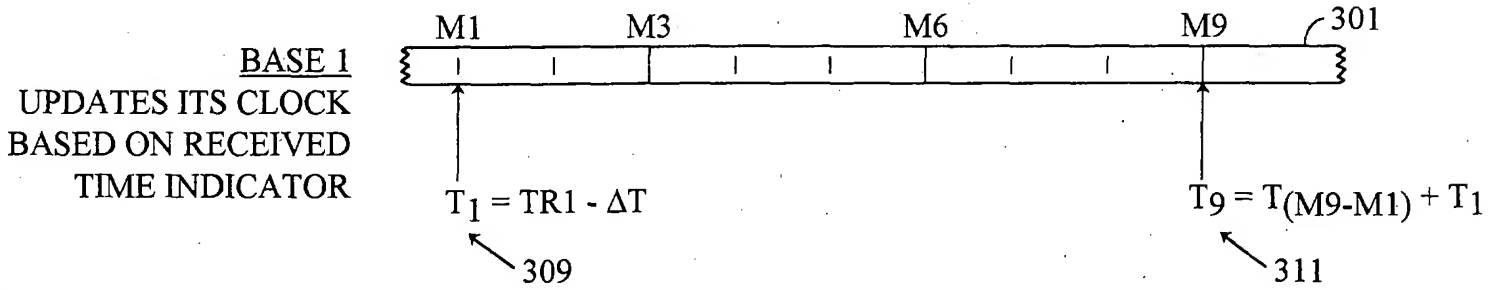
M1 M3 M6 M9
301
BASE 1
UPDATES ITS CLOCK
BASED ON RECEIVED
TIME INDICATOR
T1 = TR1 - ΔT
309
T9 = T(M9-M1) + T1
311

FIG. 6B

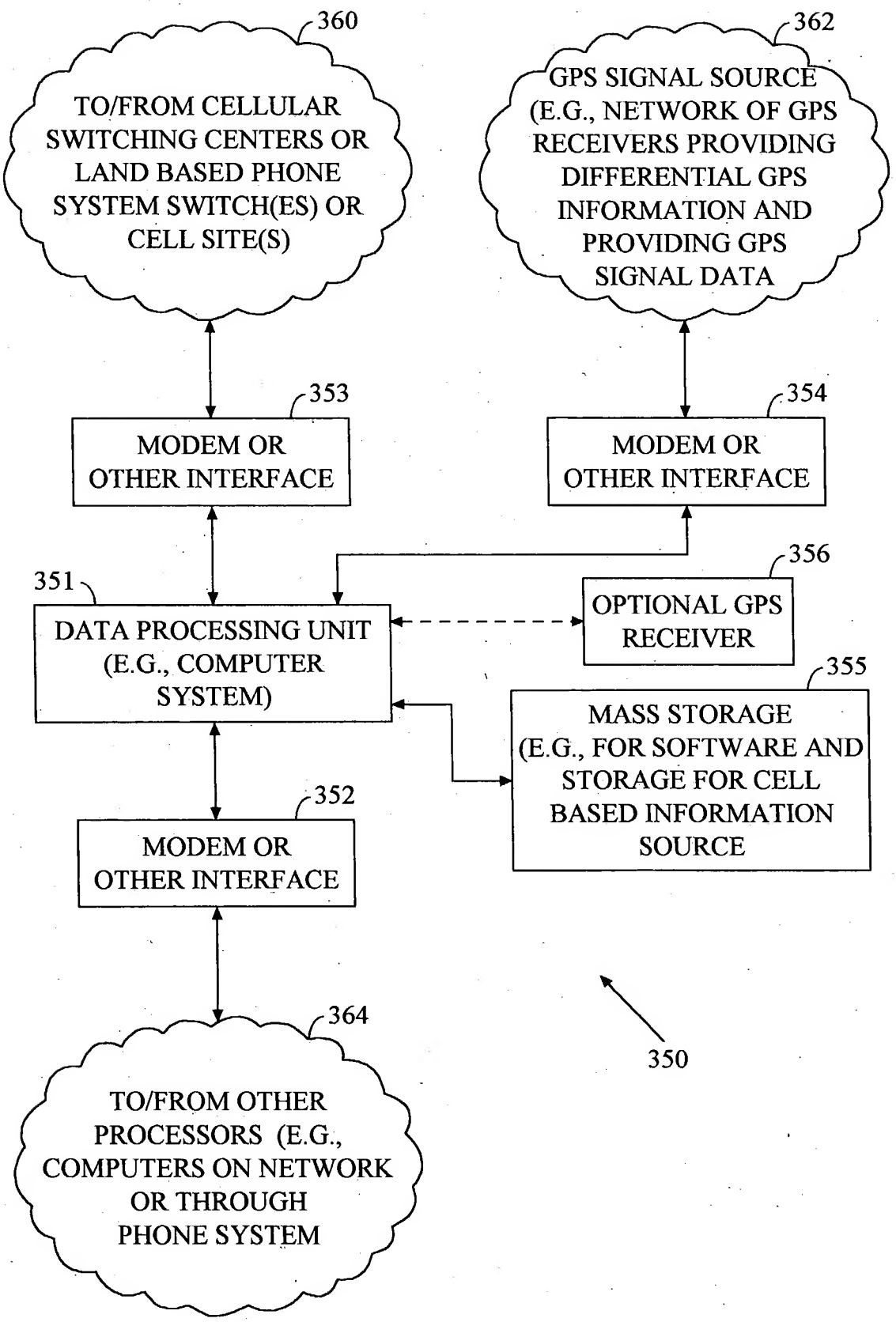
360
TO/FROM CELLULAR SWITCHING CENTERS OR LAND BASED PHONE SYSTEM SWITCH(ES) OR CELL SITE(S)
362
GPS SIGNAL SOURCE (E.G., NETWORK OF GPS RECEIVERS PROVIDING DIFFERENTIAL GPS INFORMATION AND PROVIDING GPS SIGNAL DATA
353
MODEM OR OTHER INTERFACE
354
MODEM OR OTHER INTERFACE
356
OPTIONAL GPS RECEIVER
351
DATA PROCESSING UNIT (E.G., COMPUTER SYSTEM)
355
MASS STORAGE (E.G., FOR SOFTWARE AND STORAGE FOR CELL BASED INFORMATION SOURCE
352
MODEM OR OTHER INTERFACE
364
TO/FROM OTHER PROCESSORS (E.G., COMPUTERS ON NETWORK OR THROUGH PHONE SYSTEM
350

FIG. 7

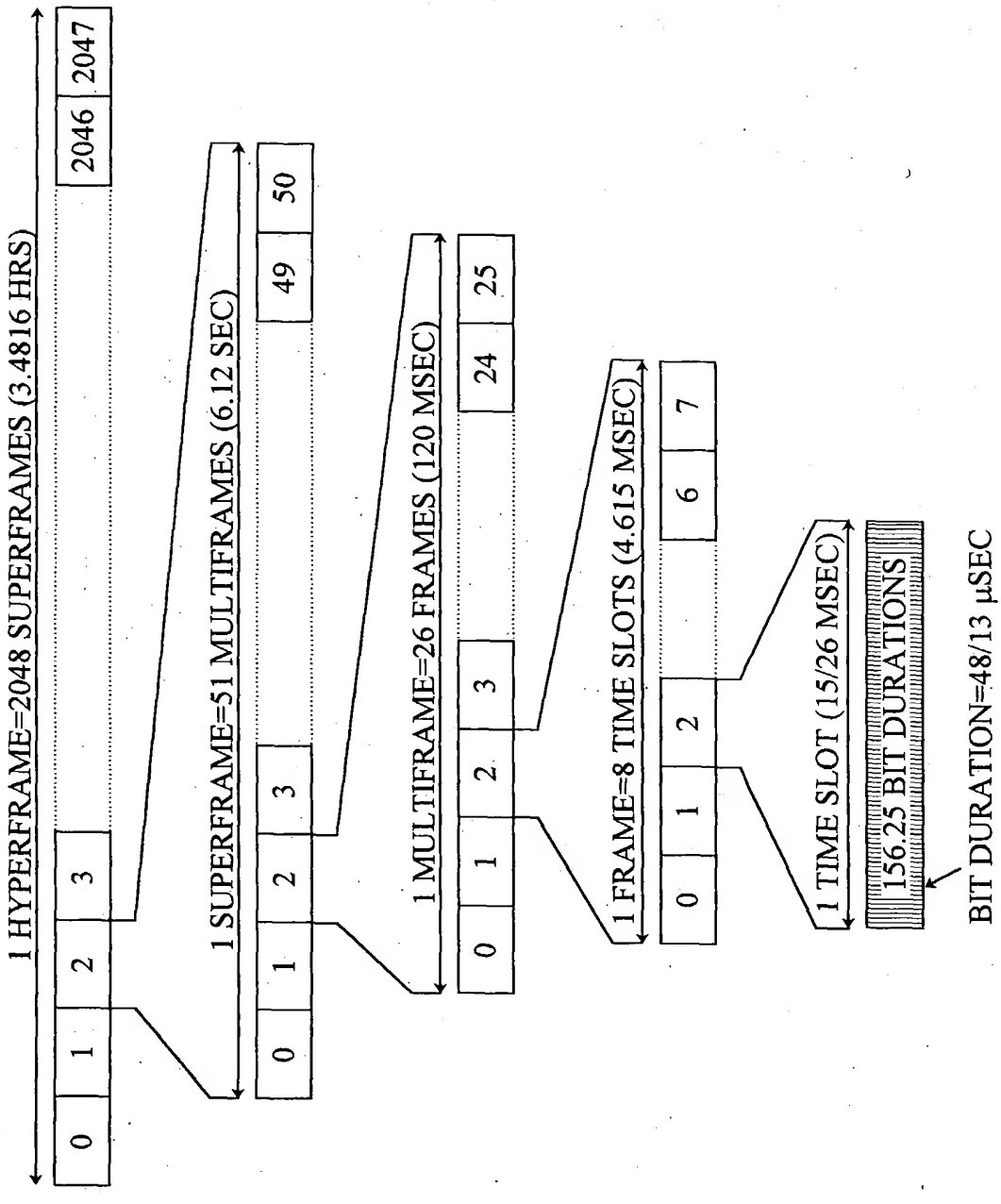
1 HYPERFRAME=2048 SUPERFRAMES (3.4816 HRS)
0
1
2
3
2046
2047
1 SUPERFRAME=51 MULTIFRAMES (6.12 SEC)
0
1
2
3
49
50
1 MULTIFRAME=26 FRAMES (120 MSEC)
0
1
2
3
24
25
1 FRAME=8 TIME SLOTS (4.615 MSEC)
0
1
2
6
7
1 TIME SLOT (15/26 MSEC)
156.25 BIT DURATIONS
BIT DURATION=48/13 µSEC

FIG. 8